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HISTORICAL PHONOLOGY FROM PROTO-FINNIC TO PROTO-LIVONIAN

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Abstract. This article serves as an attempt to reconstruct the approximate chronological order of the major sound laws between (Late) Proto-Finnic and Proto-Livonian. A by-product of this study is a reconstruction of the Proto-Livonian phoneme system, the earlier versions of which have been more fragmentary and tentative. In the end, it is briefly discussed when and where the Livonian proto-language was spoken before its splitting into Courland and Salaca Livonian.

Keywords: historical phonology, Proto-Finnic, Proto-Livonian, Courland Livonian, Salaca Livonian

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1. Introduction

While there are difficult to classify intermediate dialects between all the other Finnic languages, Livonian stands as the only exception, at least if we dismiss the linguistically unsubstantiated working hypotheses of Salaca Livonian as a Livonian-Estonian mixed language (cf. Kettunen 1947: 9–10, Koponen 1990: 38–39). Among all the Finnic proto-dialects, therefore, Proto-Livonian unambiguously refers to the common proto-language of Courland and Salaca Livonian, something whose earlier existence can no longer be denied (see Pajusalu et al. 2009).

However, there have been only a few preliminary attempts to reconstruct Proto-Livonian (e.g., Pajusalu 2014), which is no wonder, as the Old Livonian sources have not been easily available until very recently (Winkler 1994, 1999). On the other hand, the classic Livonian dictionaries (Sjögren and Wiedemann 1861, Kettunen 1938) have now finally been joined by new works for both Salaca Livonian (Winkler and Pajusalu 2009) and Courland Livonian (Viitso and Ernštreits 2012). Hence, the time could not be better for reconstructing Proto-Livonian.

My starting point is the (Late) Proto-Finnic phoneme system (see Table 1) which is close to the traditionally reconstructed system, apart from **c* (Kallio 2007), **ë* (Kallio 2014), and weak-grade **b*, **d*, **g* pro **β*, **ð*, **γ* (cf. already Setälä 1899). All consonants other than **h*, **r*, **v*, and **j* also occurred as geminates. In word-initial stressed syllables, all vowels occurred as short or long, whereas non-initial unstressed syllables had neither long vowels nor short **ö*. Unless otherwise stated, all nouns are given in the nominative singular and all verbs are given in the third person present indicative. As for the abbreviations, C stands for Courland Livonian (Viitso and Ernštreits 2012) and S for Salaca Livonian (Winkler and Pajusalu 2009).

Table 1. Proto-Finnic phonemes

<i>p</i> [~ <i>b</i>]	<i>t</i> [~ <i>d</i>]	<i>k</i> [~ <i>g</i>]				
	<i>c</i>		<i>i</i>	<i>ü</i>		<i>u</i>
	<i>s</i>	<i>h</i>				
<i>m</i>	<i>n</i>		<i>e</i>	<i>ö</i>	<i>ë</i>	<i>o</i>
	<i>l</i>					
	<i>r</i>		<i>ä</i>		<i>a</i>	
<i>v</i>	<i>j</i>					

2. Major sound laws from Proto-Finnic to Proto-Livonian

2.1. Elimination of **c*

The deocclusion **c* > **s* was common to all of Finnic with South Estonian being the sole exception (Kallio 2007: 241–242, 2014: 157):

- **cika* > **sika* (> C *sigā*, S *šiga*) ‘pig’.
- **kakci* > **kaksi* (> C *kakš*, S *kaks*) ‘two’.
- **keüci* > **keüsi* (> C *kieuž*, S *Käus*) ‘rope’.
- **süci* > **süsi* (> C *si’ž*, S *šius*) ‘charcoal’.

There were only two exceptions to the deocclusion **c* > **s* (see 2.3. for the cluster **nc*). The first was the development **ck* > **tk*, again common to all of Finnic apart from South Estonian (Kallio 2007: 233–234, 2014: 157):

- **kickë-* > **kitkë-* (> C *kitkūb*, S *kitkub*) ‘to weed’.
- **kocka* > **kotka-* (> C *kuotkānōz*, S *kotkas*) ‘eagle’.

The second was the development **cr* > **tr* (Kallio 2012: 231), the distribution of which was quite peculiar, as it covered Livonian, South Estonian, most of North Estonian, Votic as well as East Finnish (see Map 1 in Viitso 2000):

- **kecrä* > **keträ* (> C *kie'ddōr*) 'spindle'.
- **ocra* > **otra* (> C *vō'ddōrz*, S *odr*) 'barley'.

Since the phoneme **c* was eliminated as a result of this change, the geminate **cc* can now also be phonologically re-analyzed as the cluster **ts*.

2.2. Developments **pt* > **ht* and **kt* > **ht*

Like most of the developments involving **c*, the developments **pt* > **ht* and **kt* > **ht* were similarly common to all of Finnic except for South Estonian (Kallio 2007: 243, 2014: 156):

- **ēktago* > **ēhtago* (> C *ō'dōg*, S *ūdug*) 'evening'.
- **vaktō* > **vahto* (> C *vq̄*, S *waht* whose ⟨h⟩ ≠ /h/; Winkler 2010) 'foam'.

In addition to their distribution, these developments having occurred early is further suggested by the fact that old **ht* (< **št*) and new **ht* (< **pt*, **kt*) were later subject to the same identical innovations (see 2.4.).

2.3. Vocalization of **n* before **s*

The vocalization of **n* before **s* was another widespread phonological innovation covering not only Livonian but also South and North Estonian (Kettunen 1962: 104) as well as Votic (Kettunen 1930: 92–94):

- **mansikka(s)* > **maasikka(s)* (> C *mōškōz*, S *māžik*) 'strawberry'.
- **pēnsas* > **pēšas* (> C *pōzōz*) 'bush'.

Note that **n* was also vocalized before **s* going back to **c* (cf. 2.1.), although the attested Livonian forms would seem to suggest otherwise:

- (**kanci* >) **kansi* > **kaasi* (> C *kōņtš*, S *kāns*) 'cover, deck'.
- (**künci* >) **künsi* > **küüsi* (> C *kīņtš*, S *kūns*) 'nail, claw'.
- (**lanci* >) **lansi* > **laasi* (> C *lōņtš*, S *lān*) 'forested lowland'.
- (**lānci* >) **lānsi* > **lāüsi* (> C *lēņtš*) 'southwest'.

Crucially, however, the lengthened vowel in these forms cannot be explained in any way other than the vocalization of **n* before **s*. In Courland Livonian, therefore, the singular *kōņtš* and the plural

kõndõd should be considered analogical, as we would instead expect the singular **kõž* and the plural **kāndõd* (Setälä 1899: 363, Posti 1942: 253–255, Kettunen 1947: 52–53). The vocalization of **n* before **s* could furthermore be connected to the vocalization of **n* word-finally, similarly covering not only Livonian but also South and North Estonian (Kettunen 1962: 106–107) as well as Votic (Kettunen 1930: 96–104), although only in Votic the resulting long vowel was not shortened soon afterwards. On the other hand, there is also evidence to suggest that word-final **n* was preserved longer than word-final **k* (see 2.6).

2.4. Elimination of **h*

Even though **h* was very often lost in North Estonian (Kettunen 1962: 96–103) and Votic (Kettunen 1930: 83–90), Livonian completely eliminated this phoneme (Posti 1942: 145–147, 239–251, 278, Kettunen 1947: 50–52, Winkler 1994: 417, 420), suggesting that we are no longer dealing with a shared innovation. Yet the Livonian loss of **h* would seem to have taken place very early, because dozens of Livonian personal and place names in Henry's chronicle of Livonia written between 1224 and 1227 show no *h*, regardless of their suggested etymologies (see especially Alvre 1984–1985). As both word-initial and word-final **h* was always lost without a trace, we may move on to word-medial **h* similarly lost without a trace in post-consonantal position:

- **tarha* > **tara* (> C *tarā*, S *tara*) 'fence, yard'.
- **vanha* > **vana* (> C *vanā*, S *vana*) 'old'.

The same also happened after a diphthong except that its second component was replaced by the corresponding semivowel:

- **jauho* > **javo* (> C *jo'v*, S *jao*) 'flour'.
- **laiha* > **laja* (> C *lajā*) 'lean'.

The cases above also included all words with earlier **hv* as well as one word with earlier **hj*, both metathetized even earlier:

- (**hēhvo* >) **hēuho* > **ēvo* (> C *õ'v*) 'heifer'.
- (**tühjä* >) **tüihä* > **tūjä* (> C *tijā*, S *tüä*) 'empty'.

Everywhere else, pre-consonantal **h* was reduced to a glottal stop, **ʔ*, which was soon lost after unstressed syllables:

- **ahjo* > **aʔjo* (> C *q'j*, S *āi*) 'oven'.
- **ehti-* > **eʔti-* (> C *ēḑōb*, S *ēdub*) 'to dress'.

- **pohja* > **poʔja* (> C *pū'oj*, S *puoj*) 'base, north'.
- **puhdas* > **puʔdas* (> C *pū'dōz*, S *pūdas*) 'pure'.
- **vajēhta-* > **vajēʔta-* > **vajēta-* (> C *va'idōb*) 'to exchange'.

The reduction **h* > **ʔ* also took place in inter-vocalic position, although this time **ʔ* was not yet lost after unstressed syllables:

- **kehä* > **keʔä* (> C *kejā*) 'body, torso'.
- **pühä* > **püʔä* (> C *pivā*, S *püa*) 'holy'.
- **raha* > **raʔa* (> C *rō'*, S *rā*) 'money'.
- **rahi* > **raʔi* (> C *ra'j*) 'chair'.
- **rēhu* > **rēʔu* (> C *rō'v*) 'lawn' (see already Kettunen 1947: 51).
- **riihi* > **riiʔi* (> C *rī'*) 'barn'.
- **roohi* > **rooʔi* (> S *ruoi*) 'grass'.
- **rukih-ē-t* > **rukiʔēt* (> C *ri'ggōd*, S *rügged*) 'rye' (NPl).
- **tupa-hēn* > **tupaʔēn* (> C *tu'bbō*, S *tub*) 'room, house' (IISg).

However, **ʔ* was a short-lived phoneme (see 2.10.) which also differed from all the rest of the consonants, because it never shared the otherwise general consonant developments, such as the palatalizations **((C)C)Ci* > **((Ć)Ć)Ći* and **Cj* > **Ć(Ć)* (see 2.7.).

2.5. Mergers of non-initial-syllable vowels

Although there were also mergers of non-initial-syllable vowels in North Estonian (Kettunen 1962: 146–162), those in Livonian were rather different and thus better explained as unrelated. Leaving aside more detailed sound laws blurred by analogical leveling, we may generalize that after the mergers **a/*ä* > **a* and **e/*ē/*o/*u/*ü* > **u* there were only three non-initial-syllable vowels left, namely **a*, **i*, and **u*. Apparently, the second component **ü* of initial-syllable diphthongs was subject to the same merger:

- (**keüci* >) **keüsi* > **keusi* (> C *kieuž*, S *Käus*) 'rope'.
- (**täüci* >) **täüsi* > **täusi* (> C *täuž*, S *täus*) 'full'.

Instead, most syncopes and apocopes typical of Livonian did not yet occur this early, apart from certain trisyllabic or longer words omitted here for the sake of brevity (cf. 2.13.).

2.6. Neutralization of gradation

Non-initial single obstruents became voiced in voiced surroundings: $*p > *b$, $*t > *d$, $*k > *g$, $*s > *z$ (except word-finally $*k > \emptyset$). Thus, gradation of single stops was neutralized due to the merger of strong and weak grades. The same can also be said about gradation of geminate stops, and in general, geminate obstruents can now be phonologically re-analyzed as single obstruents (which may have remained phonetically half-long): $*pp > *p$, $*tt > *t$, $*kk > *k$, $*ss > *s$. However, there was one very important exception to the rules above, namely the reduction $*d > *ʔ$ between an unstressed syllable and an open final syllable:

- $*suku-da > *suguʔa$ ($> C su'ggō$, S *sugg*) ‘sex, tribe’ (PSg).
- $(*vetā-dāk > *vetada > *vedaʔa$ ($> C vie'ddō$, S *ved(d) ~ vād(d)*) ‘to pull’ (Inf).

As the examples above also suggest, the reduction $*d > *ʔ$ mainly took place in the partitive singular of nouns and the infinitive of verbs, the latter of which further shows that word-final $*k$ was already lost, whereas the genitive plural of nouns shows that word-final $*n$ was still preserved (cf. 2.3.):

- $(*pühā-den > *pūʔadun \equiv (> C pivād$, S *püäd*) ‘holy’ (GPL).

Thus, adjectives in $*-EdA$ preserved $*d$ just because the genitive singular was analogically generalized as the nominative singular (e.g., $*pimedā$, GSg $*pimedān > C pi'mdō$, S *pimd* ‘dark’; Viitso 2007: 58), which was something that was quite common in Livonian (e.g., $*hibus$, GSg $*hibuksēn > C ibūks$, S *ibuks* ‘hair’; $*sūdān$, GSg $*sūtāmen > C sidām$, S *šuda* ‘heart’).

2.7. Palatalization

Palatalization of consonants (see especially Korhonen 1969) never took place in word-initial position, only non-initial-syllable $*i$ palatalized the preceding consonant or consonant cluster: $*((C)C)Ci > *((\acute{C})\acute{C})\acute{C}i$. Meanwhile, $*j$ not only palatalized but was also assimilated to the preceding consonant, although in the case of obstruents it has been debated whether these were shortened to single obstruents through geminates (Posti 1942: 262–265, Winkler 1994: 419) or directly (Kettunen 1947: 48–49, 53–54, Viitso 2007: 57). As otherwise there

seem to have been no geminate obstruents left (cf. 2.6.), I omit all these unnecessary intermediate stages from my following examples, starting from one of the few Common Finnic words with **pj*:

- (**kapja* >) **kabja* > **kab̥a* (> C *kābā*) ‘hoof’.

Note that palatalization of labial consonants shifted only later to the preceding vowel causing umlaut (see 2.11.b). However, palatalization of dental consonants was preserved, as shown by the words with **tj*:

- (**hutja* >) **udja* > **ud̥a* (> C *uḍā*) ‘spear’.
- (**patja* >) **padja* > **pad̥a* (> C *paḍā*, S *pade*) ‘pillow’.

Judging from Salaca Livonian (whose orthography was admittedly clumsy), palatalization of velar consonants was similarly preserved throughout Common Livonian, only after which the words with earlier **kj* were subject to *i*-epenthesis in Courland Livonian:

- (**akja* >) **agja* > **aḡa* (> C *aigā*, S *ad̥a* ~ *adja*) ‘edge’.
- (**lakja* >) **lagja* > **laḡa* (> C *laigā*, S *ladja*) ‘wide’.
- (**makjas* >) **magjaz* > **maḡaz* (> C *maigāz*, S *mad̥āks*) ‘lustful’.
- (**rakja* >) **ragja* > **raḡa* (> C *raigā*) ‘hip, thigh’.
- (**vakja* >) **vagja* > **vaḡa* (> C *vaigā*) ‘wedge’.

The clusters of a sibilant and **j* were again comparable to those of a dental stop and **j*:

- (**asja* >) **azja* > **aža* (> C *ažā*, S *aza* ~ *aža*) ‘thing, tool’.
- (**hosja* >) **ozja* > **oža* (> C *vōžā*) ‘horsetail (*Equisetum*)’.

The apparent reason for some to postulate intermediate geminates for palatalized obstruents has been the fact that palatalized liquids did indeed have them, although these were later shortened in the weak grade, which resulted in compensatory lengthening of the preceding vowel in Courland Livonian (see 2.13.):

- (**haljas* >) **aljaz* > **all̥az* (> C *ḡlaz*, S *ales*) ‘green’.
- (**harja* >) **arja* > **ar̥ra* (> C *ḡra*, S *are*) ‘brush’.
- **karja* > **kar̥ra* (> C *kḡra*, S *kare*) ‘herd’.
- **korja* > **koṛra* (> C *kūoṛōb*, S *koreb*) ‘to gather’.
- **marja* > **maṛra* (> C *mḡra*, S *mare*) ‘berry’.
- **nalja* > **nall̥a* (> C *nḡla*, S *nalja*) ‘joke’.
- (**neljä* >) **nelja* > **nell̥a* (> C *nēla*, S *nelā*) ‘four’.
- (**paljas* >) **paljaz* > **pall̥az* (> C *pḡlaz*, S *pales*) ‘bare’.
- **vilja* > **vill̥a* (> C *vīla*, S *vila* ~ *vile*) ‘crop’.
- (**väljä* >) **välja* > **väll̥a* (> C *vēla*, S *vel*) ‘sparse’.

Note that there were no Proto-Finnic words with **mj* or **nj* (e.g., C *mīṇa*, S *mina* ‘daughter-in-law’ go back to trisyllabic **minijä*, judging from Estonian *minia*, Võro *minnij*, etc. ‘id.’).

2.8. Post-consonantal and post-diphthongal **v*

As post-consonantal **v* was subject to similar developments as post-consonantal **j* (cf. 2.7.), these developments can plausibly be considered simultaneous as well. Also in this case, it has been advocated that **v* was assimilated to the preceding obstruent through an intermediate geminate (Posti 1942: 265–268, Winkler 1994: 419), although it is more economical to think that **v* was simply lost after an obstruent (Kettunen 1947: 54, Viitso 2007: 57). As Common Finnic had no clusters **pv* or **kv*, the only cluster of a stop and **v* was **tv*:

- (**latva* >) **ladva* > **lada* (> C *ladā*, S *lada*) ‘top’.
- (**vatvo-* >) **vadvu-* > **vadu-* (> C *vadūb*) ‘to pluck’.

As one can see, the forms above are identical to those without earlier **v* (cf. **sata* > C *sadā*, S *sada* ‘hundred’; **kato-* > C *kadūb*, S *kadub* ‘to disappear’), and the same also applies to the clusters of a sibilant and **v*:

- (**kasva-* >) **kazva-* > **kaza-* (> C *kazāb*, S *kazab*) ‘to grow’.
- (**rasva* >) **razva* > **raza* (> C *razā*, S *raza*) ‘fat’.

Unlike with geminate obstruents, it is necessary to postulate the presence of geminate liquids:

- (**harva* >) **arva* > **arra* (> C *q̄ra*) ‘rare’.
- (**hīrvas* >) **īrvaz* > **īrraz* (> S *ira*) ‘stallion’.
- **karva* > **karra* (> C *kq̄ra*, S *kara*) ‘hair, feather, colour’.
- (**karvas* >) **karvaz* > **karraz* (> C *kq̄raz*) ‘bitter’.
- **korva* > **korra* (> C *kūora*, S *kora*) ‘ear’.
- (**külvä-* >) **külva-* > **külla-* (> C *kīlab*, S *kūlab*) ‘to sow’.
- **salva-* > **salla-* (> S *salab*) ‘to bite’.
- **tërva* > **tërra* (> C *tōra*, S *tūrra*) ‘tar’ (cf. S *tūrv* ‘id.’ ← Estonian).

While the low vowel **a* was preserved after the cluster of a liquid and **v*, the high vowels **i* and **u* (see 2.5.) were, in turn, lowered to **o* (> C *a*, S *u*):

- (**arvo* >) **arvu* > **arro* (> C *q̄ra*) ‘thought’.
- (**hīrvi* >) **īrvi* > **irro* (> C *īra*) ‘deer’.

- **järvi* > **järro* (> C *jōra*, S *jāru*) ‘lake’ (cf. Henry’s *Astigerwe*, *Astgerwo*, etc. ‘Lake Burtnieks’; Alvre 1985: 34).
- (**kirves* >) **kirvuz* > **kirroz* (> C *kīraz*, S *ķīru*) ‘ax’.
- (**palvo* >) **palvu* > **pallo* (> C *pōlab*) ‘to ask’ (whereas S *polgub* ‘to pray’ cannot belong here because it derives from **polkē*- and thus may be related to C *pūolgōb* ‘to scorn’).
- **pilvi* > **pillo* (> C *pīla*, S *pīlu*) ‘cloud’.
- **polvi* > **pollo* (> C *pūola*, S *polu*) ‘knee’.
- **sarvi* > **sarro* (> C *sōra*, S *saru*) ‘horn’.
- **talvi* > **tallo* (> C *tōla*, S *talv*) ‘winter’.
- (**terveh* >) **tervu* > **terro* (> C *tīera*, S *teru* ~ *tāru*) ‘healthy’.

New **o* must have arisen before palatalization (see 2.7.), because otherwise we would expect the Courland Livonian forms *†jāra*, *†jōra*, *†pīla*, *†pūola*, *†sōra*, and *†tōla*. My reconstruction of **o* can of course be doubted due to its low frequency, but at least we would no longer need to resort to analogical hypotheses (cf. Posti 1942: 51–53, Kettunen 1947: 34, Winkler 1994: 422). True, it has been suggested that post-consonantal **v* was dialectally preserved in Salaca Livonian based on one manuscript dating to 1829 (Winkler 1999: 159–173). As closer examination shows, however, the suggested spellings *rasfv*, *farrv*, and *talw* should rather be read as *rasfo*, *farro*, and *talv*, respectively. As the recent loanword *perwid* (← Latvian *perve* ‘color’) proves nothing, the remaining proof of preserved **v* is *kaswab*, which could be an Estonianism (cf. Estonian *kasvab* ‘grows’); however, not much is known about the apparent author of the manuscript, the Vecsalaca-based Baltic German bookkeeper Johann Adam Flor (see e.g., *Kirchenbuch Salis 1706–1839/42*, available online at <<http://www.lvva-raduraksti.lv>>). At any rate, there is no need to doubt that the developments involving post-consonantal **v* were already Common Livonian, but we may also connect them to the partial progressive assimilation of **v* to the second component **i* of the preceding diphthong (viz. **VivV* > **VijV*):

- **kuiva* > **kuija* (> C *kūja*, S *kuja*) ‘dry’.
- **laiva* > **laija* (> C *lōja*, S *laja*) ‘boat’.
- **vaiva* > **vaija* (> C *vōja*) ‘pain, trouble’ (cf. S *vaive* ‘anguish’ ← Estonian).

For no obvious reason, however, there are also examples of the partial regressive assimilation of the second component **i* of the preceding diphthong to **v* (viz. **VivV* > **VuvV*):

- **kaiva-* > **kauva-* (> C *kōvab*, S *kovab*) ‘to dig’.
- **koivu* > **kouvo* (> C *kōvaz*, S *küu*) ‘birch’.
- (**päivä* >) **päiva* > **päuva* (> C *pāva*, S *pāva*) ‘day, sun’.
- (**taivas* >) **taivaz* > **tauvaz* (> C *tōvaz*) ‘heaven, storm’.

Yet the words above did not merge with the Proto-Finnic stem types **VijV* and **VuvV*, shortened even earlier to **VjV* and **VvV* (cf. also **VihV* and **VuhV* in 2.4.):

- **nuija* > **nuja* (> C *nujā*) ‘club’.
- **sauva* > **sava* (> C *sovā*) ‘stick’.

Interestingly enough, Thomas Hiärne’s list “Liwische Worte” written about 1665 (Winkler 1994: 23–30, Grünthal 2011: 196–200) suggests that no partial assimilations had occurred yet (cf. *Taiwas*, *Laiwa*, and PSg *peyweta*). Then again since the list includes several words that are not Livonian but Estonian (e.g., *Åbe*, *Kinga*, *homk* = Estonian *obe* ‘horse’, *king* ‘shoe’, *hommik* ‘morning’; Suhonen 1999: 153, Pajusalu 2007: 212), the same can also be applied here (e.g., *Taiwas* = Estonian *taevas* ‘heaven’, but its alleged synonym *Tāgi* = C *touvi*, S *touvi* ‘heaven(ly), storm(y)’). Better evidence can be seen in *Coiwa*, *Coywa*, *Goiwa*, etc. ‘Gauja’ mentioned in Henry’s chronicle of Livonia (Alvre 1985: 34), even though Courland Livonian *Koiva* is a recent Estonian borrowing and no Salaca Livonian hydronym for the Gauja is attested (Pajusalu and Winkler 2011: 180–181, Kallio 2015: 42–44).

2.9. Labial dissimilation

Labial dissimilation here means the dissimilation of labial vowels to illabial vowels before another, but different, labial vowel or **v* (Posti 1942: 123–129, Winkler 1994: 402–403). Firstly, the diphthong **ou* was dissimilated to **ëu*, irrespective of whether it was inherited from Proto-Finnic or due to the partial assimilation **oiv* > **ouv* (see 2.8.):

- (**koivu* >) **kouvo* > **këuvo* (> C *kōvaz*, S *küu*) ‘birch’.
- (**pouta* >) **pouda* > **pëuda* (> C *pōda*, S *pūda*) ‘sultry’.

All the exceptions can be otherwise explained (e.g., C *jōdab*, S *joudab* ‘to reach, to be able’ are later Latvian borrowings from the same Baltic source **jaudā-* ‘to be able’ as earlier Proto-Finnic **jouta-* ‘to be able, to reach’; Koivulehto 1991: 77). Since Proto-Finnic had no further diphthongs consisting of labial vowels alone (cf.

Kallio forthcoming), we may move on to the compound **ov* which, as expected, was dissimilated to **ëv*:

- **kova* > **këva* (> C *kõvā*) ‘hard’.
- (**kovëra* >) **kovura* > **këvura* (> C *kõ’urõ*, S *küur*) ‘crooked’.

However, the compound **uv* was apparently dissimilated to **iv*:

- (**suvi* >) **suvi* > **siivi* (> C *sõ’v*, S *süü*) ‘summer’.
- **uva* > **iva* (> C *õvā*, S *üva*) ‘flow’.

The compound **üv* was in turn dissimilated to **iv* which was later word-initially subject to the breaking **iv* > **juv*, whereas most further developments were restricted to the eastern dialects of Courland Livonian (e.g. initial *juv* > *jõv* and non-initial *iv* > *õv*):

- (**hüivä* >) **tüva* > **iva* > **juva* (> C *jõvā*, S *jua*) ‘good, right’.
- (**tüvi* >) **tüvi* > **tivi* (> C *tõ’v*) ‘stem’.
- (**tüivä* >) **tüva* > **tiva* (> C *tõvā*, S *tiva*) ‘deep’.

Once again the exceptions can be otherwise explained (e.g., C *pivā*, S *püa* ‘holy’ had not yet been subject to the development **püä* > **püva*; 2.10.). However, old **ë* inherited from Proto-Finnic as well as new **ë* and **i* due to labial dissimilation soon merged as **i* (> C *õ*, S *ü*), and in the same connection also old and new **ëë* (see 2.3.) was raised to **iï* (> C *õ*, S *ü*) which, therefore, was not subject to the diphthongization of long mid-low vowels (see 2.14.). As **i* and **iï* were not subject to umlaut either (see 2.11.b), these cannot be considered back but central vowels (see e.g., Posti 1942: 17–19, 27, 135–136, Kettunen 1947: 26, Winkler 1994: 395–396, 399, Pajusalu 2012: 215–217, 2014: 154–160).

2.10. Elimination of **ʔ*

The glottal stop **ʔ* earlier reduced from **h* (see 2.4.) and partly also **d* (see 2.6.) was reduced even further until it was no longer an independent consonant phoneme but a suprasegmental feature of the preceding vowel, eventually known as a broken tone (see especially Vihman 1971: 299–331 whose two-step model to explain the rise of the broken tone I intend to rehabilitate here). Whenever **ʔ* was pre-consonantal, the preceding vowel was also lengthened:

- (**ahjo* >) **aʔju* > **a’aju* (> C *õ’j*, S *āi*) ‘oven’.
- (**ehtī-* >) **eʔdī-* > **e’edī-* (> C *ē’dõb*, S *ēdub*) ‘to dress’.

- (**pohja* >) **poʔja* > **po'oja* (> C *pū'oj*, S *puoj*) 'base, north'.
- (**puhdas* >) **puʔdaz* > **pu'udaz* (> C *pū'dōz*, S *pūdas*) 'pure'.

One does not need to go further than Latvian to find a parallel of a glottal stop turning into a broken tone (see e.g., Derksen 1995). Intervocalic *ʔ was subject to a bit more complicated developments, but at least between two identical vowels the end result was similarly a long vowel with a broken tone:

- (**raha* >) **raʔa* > **ra'a* (> C *rā̃*, S *rā*) 'money'.
- (**riihi* >) **riiʔi* > **ri'i* (> C *rī̃*) 'barn'.

The same also happened between two different vowels in trisyllabic or longer words (e.g., **lihabainēn* > C *lī'ebi* 'fatty'), whereas *ʔ between two different vowels in disyllabic words was shifted to either **v* or **j*, and this time the preceding vowel remained short and without a broken tone. First, **v* arose before **a* after a labial vowel and before **u*:

- (**pühä* >) **püʔa* > **püva* (> C *pivā*, S *püa*) 'holy'.
- (**rēhu* >) **rīʔu* > **rīvu* (> C *rō̃v*) 'lawn'.

Otherwise, that is, before **a* after an illabial vowel and before **i*, the result was **j*:

- (**kehä* >) **keʔa* > **keja* (> C *kejā*) 'body, torso'.
- (**rahi* >) **raʔi* > **raji* (> C *ra'j*) 'chair'.
- (**roohi* >) **rooʔi* > **rooji* (> S *ruoi*) 'grass'.

At least *ʔ > **v* occurred following labial dissimilation (because otherwise **püva* > *ʔpiva*; 2.9.), whereas *ʔ > **j* occurred prior to umlaut of non-high front vowels (since **keja* > **ķeja*; 2.11.a). What we still have left is intervocalic *ʔ between unstressed non-initial syllables, where its loss led to a long vowel but without a broken tone, since the latter only occurred in stressed initial syllables:

- (**rukih-ē-t* >) **ruḡiʔud* > **ruḡiid* (> C *ri'ggōd*, S *rügged*) 'rye' (NPI).
- (**suku-da* >) **suguʔa* > **suguu* (> C *su'ggō*, S *sugg*) 'sex, tribe' (PSg).
- (**tupa-hēn* >) **tubaʔu* > **tubaa* (> C *tu'bbō*, S *tub*) 'room, house' (IISg).
- (**vetä-dāk* >) **vedaʔa* > **vedaa* (> C *vie'ddō*, S *ved(d) ~ vād(d)*) 'to pull' (Inf).

Finally, it should be emphasized that the broken tone primarily occurred in long vowels corresponding only to Proto-Finnic **h* and that it did not arise anywhere else until reductions of non-initial-syllable vowels (cf. *C ra'j* and *rõ'v* above, whose broken tone had nothing to do with their earlier **h*, but resulted from the apocope of word-final **i* and **u*; 2.13).

2.11a. Umlaut of non-high front vowels

Newly palatalized consonants and consonant clusters (see 2.7.) as well as the only actual palatal consonant **j* triggered umlaut, that is, the raising of the preceding non-high front vowel (Posti 1942: 108–119, Kettunen 1947: 24–25), something that was sooner or later accompanied with the depalatalization of palatalized labial consonants. Firstly, **ä* was umlauted to the unrounded mid-high front vowel **e̊*:

- (**käci* >) **käzi* > **ke̊zi* (> *C ke'ž*, *S kes*) 'hand'.
- (**käki* >) **kägi* > **ke̊gi* (> *C ke'g*, *S kegg*) 'cuckoo'.
- (**lämpi* >) **lämbi* > **le̊mbi* (> *C lem*, *S lemm*) 'warm'.
- (**väljä* >) **vällä* > **ve̊lla* (> *C vēla*, *S vel*) 'sparse'.

As for *E*-stems, however, the same initial-syllable vowel was usually generalized throughout the paradigm apart from the highest frequency words like 'hand' above. In general, analogy explains all exceptions to umlaut (e.g., *C vä'g*, *S vāg* 'force' do not derive from NSg **väki* but GSg **vāgen*). Note also that long vowels with or without a broken tone were similarly subject to umlaut of non-high front vowels:

- (**hähni* >) **ä'āni* > **e̊'ēni* (> *C ē'n*, *S ēn*) 'woodpecker'.
- (**tähti* >) **tä'ād i* > **te̊'ēd i* (> *C tē'd*, *S tēd*) 'star, mark'.

The umlauts **ä* > **e̊* and **ää* > **e̊e̊* can further be connected to the raising **äi* > **e̊i*, which was essentially the same umlaut **ä* > **e̊* before a palatal phoneme:

- **jäi* > **je̊i* (> *C jei*, *S jei*) 'ice'.
- **täi* > **te̊i* (> *C tei*, *S tei*) 'louse'.

As we can now see, the partial assimilation **äiv* > **äuv* (see 2.8.) occurred prior to umlaut (cf. **päivä* > *C pāva*, *S pāva* 'day'). The diphthong **äu* was not subject to umlaut even before palatalized consonants (cf. **täüci* > *C tāuž*, *S tāus* 'full'), neither was the diphthong **eu* (cf. **keüci* > *C kieuž*, *S Kāus* 'rope'), whose first component can be

compared with non-umlauted **e* (> C *ie*, S *ä* ~ *e*) rather than umlauted **ę* (> C *e*, S *e*):

- (**meci* >) **meži* > **męži* (> C *me'ž*, S *mez*) 'honey'.
- (**neljä* >) **nellä* > **nęlla* (> C *nēla*, S *nelä*) 'four'.
- (**veci* >) **veži* > **vęži* (> C *ve'ž*, S *vez*) 'water'.
- (**veli* >) **velī* > **vęli* (> C *ve'l*, S *vel*) 'brother'.

In other words, both **ä* and **e* were umlauted to **ę* just as both **ää* and **ee* were umlauted to **ęę* (> C *ē*, S *ē/ie* with/without a broken tone):

- (**ehtī-* >) **e'ed i-* > **ę'ed i-* (> C *ē'dōb*, S *ēdub*) 'to dress'.
- (**keeli* >) **keeli* > **kęeli* (> C *kēl*, S *kiel*) 'tongue'.
- (**meeli* >) **meeli* > **męeli* (> C *mēl*, S *miel*) 'mind'.
- (**peeli* >) **peeli* > **pęeli* (> C *pēl*, S *piel*) 'mast'.

The examples above can be compared to non-umlauted **ää* (> C *ā*, S *ā*) and **ee* (> C *īe*, S *ie*). The raising **äi* > **ęi* was also accompanied with **ei* > **ęi*, although the latter can be viewed as notational rather than phonological. Finally, we may move on to the remaining non-high front vowel **ö*, the examples of which going back to Proto-Finnic are so limited that we can merely assume that it was umlauted to the rounded mid-high front vowel **ō* (> C *e*, S *ö*).

2.11b. Umlaut of back vowels

Umlaut of non-high front vowels was apparently concurrent with umlaut of back vowels, the latter of which, however, was only triggered by palatalized labial and velar consonants (Posti 1942: 99–102, Kettunen 1947: 24). At least the latter did not precede the former, because then the fronting **a* > **ä* would have been followed by the raising **ä* > **ę*, but this did not happen, as shown by the examples below of the umlaut **a* > **ä* before a palatalized labial consonant:

- (**kapja* >) **kab'a* > **kāba* (> C *kābā*) 'hoof'.
- (**pappi* >) **pāpi* > **päpi* (> C *pāp*, S *pāpp*) 'priest'.
- (**sappi* >) **zāpi* > **zāpi* (> C *zāp*, S *zāpp*) 'bile' (cf. irregular **s* > **z*).
- (**savi* >) **sāvi* > **sävi* (> C *sā'v*, S *sai*) 'clay'.
- (**tammi* >) **taṁmi* > **tāmmi* (> C *tām*, S *tamm*) 'oak'.

The word for 'priest' already had the form *Peppe* in Hiärne's word list mentioned above, and this time it can in no way be Estonian (cf. Estonian *papp* 'priest'). Thus, the umlaut **a* > **ä* was no doubt

Common Livonian, even though in the case of Salaca Livonian ‘clay’ and ‘oak’ the non-umlauted back vowel *a* was later analogically restored throughout the paradigm. The same analogy explains Salaca Livonian *o* in one of the few Common Finnic words subject to the umlaut **o* > **õ* (> C *e*, S *õ*) before a palatalized labial consonant:

- (**topi* >) **tõb i* > **tõbi* (> C *te’b*, S *tob*) ‘disease’.

The umlaut **u* > **ü* (> C *i*, S *ü*) before a palatalized labial consonant similarly took place in perhaps only one word going back to Proto-Finnic, but this time the non-umlauted back vowel *u* was analogically restored not only in Salaca Livonian but also in Courland Livonian:

- (**lumi* >) **lurhi* > **lumi* (> C *lu’m*, S *lum*) ‘snow’.

Yet the Old Livonian sources confirm the earlier existence of the umlauted front vowel **ü* (cf. C *Lüm* 1810, S *lühm* 1829 / *lüm* 1839; Winkler 1999: 104, 206), which is further supported by the umlaut **u* > **ü* before a palatalized velar consonant:

- (**rugis* >) **rugiz* > **rügiz* (> S *rügi*; cf. C analogical *ri’ggõz* pro *†rigiz*) ‘rye’.
- (**tuki* >) **tuği* > **tügi* (> C *ti’g*, S *tüd*) ‘support’.

Still, there were also remarkable differences between palatalized labial and velar consonants. First, while a palatalized labial consonant was enough to trigger umlaut, there was no umlaut before a palatalized velar consonant unless the following syllable also had **i*, as shown by the words with earlier **kj* not subject to umlaut (see 2.7.). And second, while the depalatalization of palatalized labial consonants was Common Livonian, that of palatalized velar consonants did not take place until Courland Livonian, whereas Salaca Livonian velar consonants were further palatalized before front vowels even including word-initial position (Winkler 1994: 416). To make everything even more confusing, another post-Proto-Livonian phenomenon was to replace umlaut of back vowels with *i*-epenthesis especially in the western dialects of Courland Livonian but in the case of long back vowels also throughout Courland Livonian (cf. **toomikkainēn* > C *tūoimki*, S *tüömki* ‘bird cherry tree’). As for diphthongs, umlaut of back vowels only affected those whose both first and second components were back vowels. As expected, therefore, **ai*, **oi*, and **ui* were not subject to umlaut, and since **ou* also had already been dissimilated to **üu*, whose first component was no longer a back vowel (see 2.9.), the only remaining back vowel diphthong was **au*:

- (**hauki* >) **au̯gi* > **ai̯gi* (> C *aig*, S *aig*) ‘pike’.
- (**laukki* >) **lau̯ki* > **lai̯ki* (> C *laik*) ‘blaze’.

Again, the process above does not look like umlaut but *i*-epenthesis (viz. **au* > **au̯* > **ai̯*?). In Salaca Livonian, however, *i*-epenthesis hardly ever occurred before palatalized labial and velar consonants but primarily before palatalized dental consonants and especially sibilants where umlaut of back vowels never occurred. Even then *i*-epenthesis sporadically occurred in only a handful of words where it, after all, looks like Common Livonian (cf. Posti 1942: 102–104, Kettunen 1947: 33, Winkler 1994: 405, Pajusalu and Teras 2012: 165–169):

- (**suci* >) **su̯zi* > **su̯zi* (> C *su̯ž*, S *suiz*) ‘wolf’.
- (**toci* >) **to̯zi* > **to̯zi* (> C *tuo̯ž*, S *toiz*) ‘truth’.
- (**vasikka* >) **va̯zika* > **va̯zika* (> S *vaisk*; cf. C derivative *vā̯ški*) ‘calf’.

Although the diphthongal orthography is no longer used in Courland Livonian, it was earlier quite widespread (Winkler 1999: 120, 128, 223, 229, 232). One could now ask whether an actual diphthong was in question or if *i* was only used to mark the palatalization of the following consonant like in Old Irish (Thurneysen 1975: 55–57). The latter alternative could even be supported by the fact that while syllables with diphthongs inherited from Proto-Finnic were counted as long, syllables with short vowels and epenthetic *i* were counted as short, because otherwise the latter could eventually have had no broken tone (see 2.13.). Yet there is also a fatal problem, namely that *i* was used in only a few words, whereas there were many more words with palatalized dental consonants and even sibilants but without epenthetic *i* (cf. **kusi* > C *ku̯ž*, S *kuz* ‘urine’). A similar sporadic innovation was *u*-epenthesis between **o* and **g* (cf. **joki* > C *jo̯ug*, S *joug* ‘river’), which obviously occurred following the labial dissimilation **ou* > **eu* (see 2.9.), not to mention that *u* did not appear in written sources until the turn of the 18th and 19th centuries (Winkler 1999: 93, 194). Thus, the Common Livonian distribution does not always prove the Proto-Livonian age.

2.12. Raisings **au* > **ou* and **av* > **ov*

The raisings **au* > **ou* and **av* > **ov* can typologically be compared to the raisings **ai̯* > **ei̯* and **aj̯* > **ej̯*, evidently connected with umlaut of non-high front vowels (see 2.11a). Yet at least Courland Livonian *aig*

(< **hauki*), *laik* (< **laukki*), and *sä'v* (< **savi*) mentioned above suggest that the raisings **au* > **ou* and **av* > **ov* occurred following umlaut of back vowels (see 2.11b). Moreover, the raisings **au* > **ou* and **av* > **ov* must similarly have occurred following the partial assimilation **aiv* > **auv* (see 2.8.) as well as the labial dissimilations **ou* > **ëu* and **ov* > **ëv* (see 2.9.). Yet the raising **au* > **ou* in particular would seem to have been Common Livonian, although the Salaca Livonian reflexes are strangely twofold:

- (**aukko* >) **auku* > **ouku* (> C *ouk*, S *auk* ~ *ouk*) 'hole'.
- (**hauto-* >) **audu-* > **oudu-* (> C *õdõb*, S *oudub*) 'to brood'.
- (**kaiva-* >) **kauva-* > **kouva-* (> C *kõvab*, S *kovab*) 'to dig'.
- **laula-* > **loula-* (> C *lõlab*, S *loulab*) 'to sing'.
- (**rauta* >) **rauda* > **rouda* (> C *rõda*, S *raud* ~ *roud*) 'iron'.
- (**taivas* >) **tauvaz* > **touvaz* (> C *tõvaz*) 'heaven, storm'.

In comparison, the raising **av* > **ov* is even trickier because there is usually no trace of it in Salaca Livonian:

- (**jauho* >) **javu* > **jovu* (> C *jo'v*, S *jao*) 'flour'.
- **kavala* > **kovala* (> C *kovāl*, S *kaval* ~ *koval*) 'clever, sly'.
- **savu* > **sovu* (> C *so'v*, S *sau*) 'smoke'.

Instead of the raisings **au* > **ou* and **av* > **ov*, therefore, we should perhaps speak of the raisings **au* > **āu* and **av* > **āv*, whose **ā* was, of course, an allophone, because there were no phonological oppositions **au* ~ **āu* ~ **ou* or **av* ~ **āv* ~ **ov* (cf. S *joug*, also attested as *jaug* 'river', although in this case the diphthong resulted from *u*-epenthesis; 2.11b).

2.13. Reductions of non-initial-syllable vowels

I have largely ignored non-initial-syllable vocalism so blurred by analogical leveling that its closer treatment belongs to morphology rather than phonology. In this presentation, therefore, I contend myself with a rough overview alone. First of all, non-initial-syllable **a* was either preserved or reduced to **ə*, the latter of which happened after the second syllable but also in the second syllable if the preceding first syllable had a long vowel, regardless of whether it was inherited from Proto-Finnic or of secondary origin (cf. 2.3., 2.10.):

- (**pēnsas* >) **pīizaz* > **pīizəz* (> C *põzõz*) 'bush'.

- (**puhdas* >) **pu'udaz* > **pu'udəz* (> C *pū'dōz*, S *pūd(as)* ~ *pū(t)š*) 'pure'.
- (**vēēras* >) **viīraz* > **viīrəz* (> C *võrōz*, S (*v*)*ūras* ~ *ūr(ū)s*) 'alien, guest'.

Extensive variation even in Salaca Livonian standards can at least in part be explained by the fact that there was no grapheme for the reduced vowel **ə*, which also seems to have been lost far more often in Salaca than Courland Livonian. Apparently, the same reduction rules also applied to the other non-initial-syllable vowels, among which **o* (see 2.8.), however, occurred neither after the second syllable nor in the second syllable if followed by a long vowel in the first syllable. In turn, the reductions of both **i* and **u* were overshadowed by their syncopes and apocopes, the former of which were conditioned and the latter of which were unconditioned. Note that the general apocope of **i* and **u* occurred following the loss of word-final **n* (see 2.3.), **h* (see 2.4.), and **k* (see 2.6.):

- (**kümmen* >) **kümmu* > **küm* (> C *kim*, S *kum*) 'ten'.
- (**murēh* >) **muru* > **mu'r* (> C *mu'r*, S *mur*) 'sorrow, worry'.
- (**roostēk* >) **roostu* > **roost* (> C *rūost*, S *ruost*) 'rust'.

Similarly, the syncope and apocope of **i* must have occurred following palatalization (see 2.7.), although it has been argued that their chronological order would have been opposite in Salaca Livonian where sibilants were never palatalized before lost **i* but only before preserved **i* (cf. S *laps*, PPl *lapši* 'child'; Posti 1945: 205–207, Winkler 1994: 405, 419–420). Yet the earlier existence of palatalization is confirmed by umlaut of non-high front vowels also occurring in Salaca Livonian before lost **i* (see 2.11.a). As the opposite relative chronology would further presuppose that Proto-Livonian would have been split up before all these innovations, I find it much more likely that Salaca Livonian was simply subject to the syllable-final neutralizations **š* > **s* and **ž* > **z*. As to the absolute chronology of these syncopes and apocopes, they seem to have occurred following Henry's chronicle of Livonia (Vääri 1996: 249), whereas Hiärne's "Liwische Worte" suggests that at least apocope had already taken place, because either there was no word-final vowel at all, or there was only silent *e* also used in German at that time (cf. Hiärne's own German translations *Kuhe* 'cow' and *schuhe* 'shoe'):

- (**pappi* >) **päpi* > **pāp* (> C *pāp*, S *pāpp*) ‘priest’ (cf. Hiärne’s *Peppe*).
- (**suci* >) **su’zi* > **su’iz* (> C *su’ž*, S *suiz*) ‘wolf’ (cf. Hiärne’s *suis*).

In any case, the latter example also shows that the primary broken tone (see 2.10.) was now finally joined by the secondary broken tone resulting from the syncope and apocopes of the second-syllable vowels **i* and **u* when the first syllable was short and followed by a voiced consonant:

- (**käci* >) **keži* > **ke’ž* (> C *ke’ž*, S *kes*) ‘hand’.
- (**käki* >) **kegi* > **ke’g* (> C *ke’g*, S *kegg*) ‘cuckoo’.
- (**savu* >) **sovu* > **so’v* (> C *so’v*, S *sau*) ‘smoke’.
- (**suku* >) **sugu* > **su’g* (> C *su’g*, S *sug*) ‘sex, tribe’.
- (**vajēhta* >) **vajuda* > **va’jdə* (> C *va’idōb*) ‘to exchange’.
- (**väsüitä* >) **vāzuta* > **vā’ztə* (> C *vā’ztōb*, S *vāstub*) ‘to tire’.

The primary and secondary broken tones can very easily be distinguished since they were restricted to long and short vowels, respectively (see once again Vihman 1971: 299–331). Similarly, when a short first syllable was followed by a voiced consonant, the secondary broken tone resulted from the reduction of the second-syllable long vowels (see 2.10.), also accompanied by compensatory lengthening of the preceding consonant:

- (**rukih-ē-t* >) **rügiid* > **rü’ggəd* (> C *ri’ggōd*, S *rügged*) ‘rye’ (NPl).
- (**suku-da* >) **suguu* > **su’ggə* (> C *su’ggō*, S *sugg*) ‘sex, tribe’ (PSg).
- (**tupa-hēn* >) **tubaa* > **tu’bbə* (> C *tu’bbō*, S *tub*) ‘room, house’ (IlSg).
- (**vetä-däk* >) **vedaa* > **ve’ddə* (> C *vie’ddō*, S *ved(d) ~ vād(d)*) ‘to pull’ (Inf).

When a short first syllable was followed by a voiceless consonant, the result was the same, except that this time there was no broken tone:

- (**rattah-ē-t* >) **rataad* > **rattəd* (> C *rattōd*, S *ratted*) ‘wagon’ (NPl).
- (**tappa-dak* >) **tapaa* > **tappə* (> C *tappō*, S *tapp*) ‘to kill’ (Inf).

When the first syllable was long, compensatory lengthening remained purely phonetic:

- (**ahjo-hēn* >) **a’ajuu* > **a’^[j]jə* (> C *ā’jō*, S *āi*) ‘oven’ (IlSg).
- (**aika-da* >) **aigaa* > **ai’^[g]gə* (> C *aigō*, S *aig ~ āig*) ‘time’ (PSg).
- (**lampah-ē-t* >) **lambdaad* > **lam’^[b]bəd* (> C *lambōd*, S *lammed*) ‘sheep’ (NPl).

- (**vanno-dak* >) **vannuu* > **van^[n]nə* (> C *vannõ*, S *vann*) ‘to swear’ (Inf).

Quantity alternation (see especially Viitso 2007) arose following this, meaning that, for instance, in the case of nouns, the weak-grade nominative singular **tara* (> C *tarā*, S *tara*) alternated with the strong-grade partitive (and illative) singular **ta’rra* (> C *ta’rrō*, S *tar*) ‘fence’, whereas in the case of verbs the weak-grade third person present indicative **valab* (> C *valāb*, S *valab*) alternated with the strong-grade infinitive **va’llə* (> C *va’llō*, S *vall*) ‘to pour’. On the other hand, quantity alternation proceeded in the opposite direction in the case of words with earlier geminates, including intervocalic **ij* and **uv* (see 2.8.), regardless of whether they were inherited from Proto-Finnic or due to the assimilations **Lj* > **ĹĹ* (see 2.7.) or **Lv* > **LL* (see 2.8.). Here geminates were instead shortened in the weak grade (see 2.7.–2.8. for further examples):

- **konna* > **ko(o)na* (> C *kūona*, S *kona*) ‘frog’.
- (**vanno-bi* >) **vannub* > **va(a)nub* (> C *võnõb*, S *vanub*) ‘to swear’.

Only in Courland Livonian was the shortening of geminates accompanied by compensatory lengthening of the preceding vowel, something that was, in fact, the most important difference between Courland and Salaca Livonian, as far as quantity alternation was concerned (Winkler 1994: 407–412). Either Salaca Livonian, too, earlier had a long vowel in the weak grade later shortened due to the analogy of the strong grade, or even more probably quantity alternation arose when Proto-Livonian was already splitting up. Namely, the first-syllable long vowel must here have been of recent origin, because the following second-syllable **a* was no longer reduced. Even so, lengthened **aa* was early enough to be raised to *ā* in Courland Livonian (cf. also **maa* > C *mā*, S *mā* ‘land, earth’; **mansikka(s)* > C *māšikōz*, S *māzik* ‘strawberry’; **raha* > C *rā*, S *rā* ‘money’), contrary to the most recent initial-syllable *ā* resulting from the lengthening of weak-grade vowels in diphthongs and in closed syllables before a resonant:

- (**aika* >) **aiga* (> C *āiga*, S *aig* ~ *āig*) ‘time’.
- (**lanka* >) **lānga* (> C *lānga*, S *lang* ~ *lāng*) ‘yarn’.

Note that in Salaca Livonian the second-syllable **a* was already lost in this position before Hiärne’s word list (cf. Hiärne’s *Jalk* = S *jālg* vs. C *jālgā* ‘leg’; Hiärne’s *Sembd* = S *sēmd* vs. C *sēmḍa* ‘milk’; Pajusalu 2007: 212).

2.14. Diphthongization of long mid-low vowels

Among the last Common Livonian phonological innovations was the diphthongization of long mid-low vowels: **ee* > **ie* (> C *īe*, S *ie*), **ōō* > **üō* (> C *īe*, S *üō*), **oo* > **uo* (> C *ūo*, S *uo*). Remarkably, the long high central vowel **iī* raised from **ēē* (see 2.9.) was not diphthongized, neither were the umlauted long mid-high front vowels **ēē* and **öö* (see 2.11a). Yet although this innovation was no doubt shared by Courland and Salaca Livonian, it did not necessarily already take place in Proto-Livonian, as new long vowels due to quantity alternation (see 2.13.) were similarly diphthongized, even though they only occurred in Courland Livonian (cf. C *kūona*, S *kona* above). Of course, sound changes can long remain operative, but it is no less probable that the diphthongization took place independently in Courland and Salaca Livonian.

3. The Proto-Livonian phoneme system

Above I have listed more than a dozen phonological innovations shared by Courland and Salaca Livonian, which combined with the earlier presented lexical evidence (Pajusalu et al. 2009) lead to only one conclusion: the existence of Proto-Livonian must be considered proven from a comparative linguistic point of view. The Common Livonian period would in fact seem to have been relatively long-lasting, because as far as the phoneme systems were concerned, Proto-Livonian (see Table 2) was obviously closer to both Courland and Salaca Livonian than to Proto-Finnic. If quantity alternation went back to Proto-Livonian (cf. 2.13.), all consonants also occurred as geminates. As for initial-syllable vowels, note especially mid-high **ē* and **ö*, distinguishable from mid-low **e* and **ō*:

- (**veci* >) **ve'ž* (> C *ve'ž*, S *vez*) 'water' (NSg).
- (**vede-n* >) **ve'd* (> C *vie'd*, S *ved* ~ *väd*) 'water' (GSg).
- (**vet-tä* >) **veta* (> C *vietā*, S *veta* ~ *vāta*) 'water' (PSg).

As we can see, in Courland Livonian **ē* (and **ö*) became *e*, whereas **e* (and **ō*) became *ie*. In Salaca Livonian, however, **ē* was marked with *e*, whereas **e* was marked with both *e* and *ä*, but since **ä* was again marked with *ä*, we can assume that Salaca Livonian retained the Proto-Livonian short front vowels as such (viz. **ē* > /e/ = ⟨e⟩; **e* > /ɛ/ = ⟨ä, e⟩; **ä* > /æ/ = ⟨ä⟩). The same also applied to the Proto-Livonian short back vowels, among which **o* was only later subject to complicated

splits in Courland Livonian (Junttila forthcoming), because most of the 19th century classics (e.g., Sjögren and Wiedemann 1861) were still closer to Proto-Livonian in this respect. If the diphthongizations **ee* > **ie*, **öö* > **üö*, and **oo* > **uo* occurred following Proto-Livonian (cf. 2.14.), all initial-syllable vowels occurred as short or long and with a plain or broken tone. In non-initial syllables, there were only the full vowels **i*, **u*, **o*, and **a* as well as the reduced vowel **ə* (but soon **o* > *C a*, *S u*; 2.8.).

Table 2. Proto-Livonian phonemes

<i>p</i>	<i>t</i>	<i>í</i>	<i>ķ</i>	<i>k</i>	<i>i</i>	<i>ü</i>	<i>ĩ</i>	<i>u</i>
<i>b</i>	<i>d</i>	<i>đ</i>	<i>ġ</i>	<i>g</i>				
	<i>s</i>	<i>ś</i>			<i>ɛ</i>	<i>ǫ</i>		
	<i>z</i>	<i>ź</i>						<i>o</i>
<i>m</i>	<i>n</i>	<i>ń</i>			<i>e</i>	<i>ö</i>		
	<i>l</i>	<i>ĺ</i>						
	<i>r</i>	<i>ŗ</i>			<i>ä</i>			<i>a</i>
<i>v</i>			<i>j</i>					

4. Proto-Livonian in its time and space

The relative chronology of the Common Livonian sound laws can next be connected to the absolute chronology of the Old Livonian sources. Unfortunately, the earliest of them, Henry’s chronicle of Livonia written between 1224 and 1227, could hardly include more ambiguous Livonian. First, the chronicle was written not only in the Latin language but also in the Latin alphabet whose six vowel graphemes (viz. *a*, *e*, *i*, *o*, *u*, *y*) were not at all enough for Livonian. Second, the orthography of Livonian names was so loose that only hapaxes had no alternative spellings. And third, Livonian was still so close to Estonian that from a purely linguistic point of view it is usually impossible to distinguish between them (e.g., the famous citation *Laula! Laula, pappi!* ‘Sing! Sing, priest!’ could very well be 13th century Livonian if Henry himself had not credited the Oeselians instead). At any rate, we can at least say that the linguistic stage represented by the chronicle was considerably earlier than Proto-Livonian.

As noted above (see 2.8.), Thomas Hiärne's "Liwische Worte" from about 1665 includes both Livonian and Estonian words, no matter what its title suggests. However, if we clear his word list of all its possible Estonianisms, what we have left is archaic Salaca Livonian still close to Proto-Livonian. From the late 18th century onwards, Hiärne was followed by several Baltic German writers who similarly had trouble distinguishing between Livonian and Estonian, not least because the concepts of 'Livonian' and 'Leivu' (i.e., the South Estonian dialect of the Upper Gauja) were easily confused (Grünthal 1997: 243–245, Viitso 2009: 270–273). For instance, as **pühā* had become **püva* (> *C pivā*, *S püa* 'holy') well before Proto-Livonian (see 2.4., 2.10.), the spellings with *h* attested between 1829 and 1846 (Winkler 1999: 113, 215) again look Estonian rather than Livonian (cf. Estonian *püha* 'holy'). Thus, Livonian studies did not begin as a science until Anders Johan Sjögren increased the size of the Livonian corpus during his 1846 and 1852 field trips.

As many of the most characteristic Courland Livonian phonological innovations, such as the illabialization of labial front vowels, did not take place until the 20th century, Salaca Livonian before its extinction in about 1868 was still so close to Courland Livonian that we may speak of dialects rather than languages. Yet the earlier Livonian-speaking area surrounding the Gulf of Rīga was geographically divided as early as the 13th century when the mouth of the Daugava began to be both Latvianized (Winkler 2002: 428) and Germanized (Winkler 2014: 215–216). Even so, Proto-Livonian was not necessarily linguistically divided so soon thereafter, as its speakers were well-known seafarers, and the fastest route between the Livonian Coast and the mouth of the Salaca was always straight by sea, not by land. As Proto-Livonian was evidently later than Henry's chronicle of Livonia but only a bit earlier than Hiärne's word list, we may safely date it to the year 1500 ± 100, that is, about a millennium later than Proto-Finnic (cf. Kallio 2014 which must now be supplemented by Lang 2015).

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Abbreviations

C – Courland Livonian, GPI – genitive plural, GSg – genitive singular, Inf – infinitive, IISg – illative singular, NPl – nominative plural, NSg – nominative singular, PPl – partitive plural, PSg – partitive singular, S – Salaca Livonian

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Kokkuvõte. Petri Kallio: Ajalooline fonoloogia algläänemeresoomest agliivini. Artikkel esitab katse rekonstrueerida peamiste häälikumuutuste ligikaudse kronoloogilise järgnevuse (hilise) algläänemeresoome ja agliivi keele vahel. Selle uurimuse kõrvaltulemuseks on agliivi foneemisüsteemi rekonstruktsioon, mille varasemad versioonid on olnud fragmentaarsemad ja esialgsed. Lõpuks arutletakse artiklis lühidalt selle üle, millal ja kus räägiti liivi algkeelt enne, kui see eristus Kuramaa ja Salatsi liivi keeleks.

Märksõnad: ajalooline fonoloogia, algläänemeresoome, agliivi, kuraliivi, salatsiliivi

Kubbõvõttõks. Petri Kallio: Istõrili fonolõgij vāldamiersuomõ ežžõmkīelst līvõ ežžõmkīel sõñõ. Kēras sõb kõļdõt rekonstruētõt pāmizt killijidmõitõkst ležgõliz kronolõgiliz kõrda (obbiz) ežžõmvāldamiersuomõ ja ežžõmlīvõ kīel vail. Sīe tuņšlõks aigārezultātõks um ežžõmlīvõ fonēmõd sistēm rekonstruksij, kīen jedlõmizt versijd attõ vōnnõd fragmentārimizt ja īrgalizt. Lopāndõksõks sõb lītõld nõvvõ vōttõd il sīe, kunā ja kus rōkāndizt e’žžõmlīvõ kīeldõ jedmõl laggimizt Kurāmõ ja Salāts līvõ kīelõks.